TECHNOLOGY DEPARTMENT WITH METALLURGICAL SECTION

The CHEMICAL AGE

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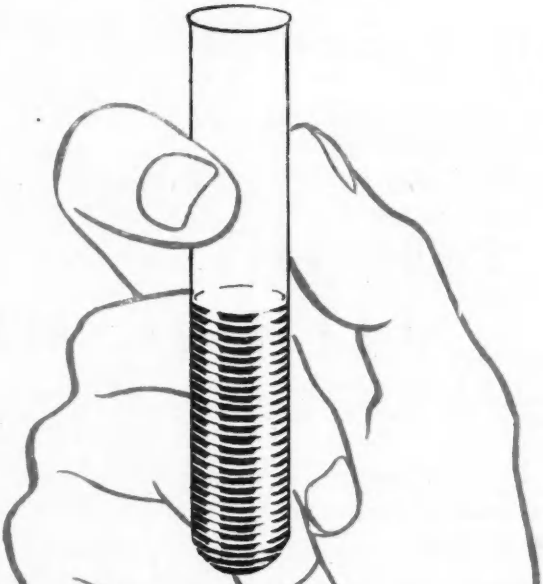
INDEX TO ADVERTISERS
IN THIS ISSUE



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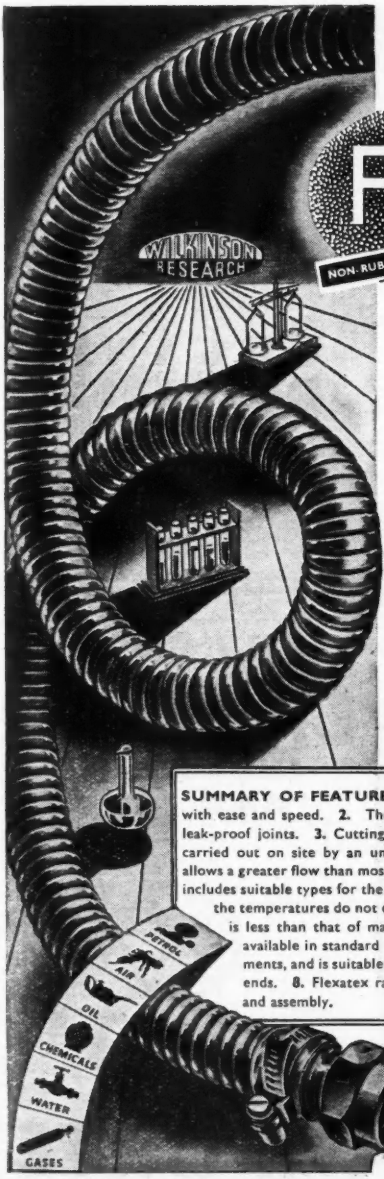

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Distillation Technique

THE time-honoured method of fractionation involves changing the state of the liquid into that of a vapour which is then condensed in stages in some suitable apparatus. The result of this technique is to obtain fractions of varying boiling points which may require to be re-vaporised and re-condensed in stages one or more times until the desired degree of separation is reached. In the laboratory the process is laborious and consumes a great deal of time. It is possible, however, to carry on a fractional distillation by more practical methods which eliminate nearly all this labour and time, and permit separations not only equal to those obtained by the laboratory process but even surpassing it in quality and purity of product.

Learned books have been written upon this subject and there are experts in the chemical and allied industries who are occupied in designing plant for the separation of a quite considerable range of products, some of which involve fractionation technique of no little complexity and require a high degree of specialised knowledge.

One phase of this process has not received the attention which it deserves, partly because it has not seemed necessary to pay any great attention to it—and indeed with many substances it is not necessary to do so—and partly because this part of the process does not lend itself to scientific analysis in quite the same way as does the separation of the vapours by fractionation. We refer to the operation of converting a liquid into a vapour.

Where the vaporisation of the liquid can be effected by steam heaters there is perhaps little to be gained from an elaborate examination of the subject except in regard to the effective utilisation of the steam. On that score the steam engineer comes into his own. It is necessary to consider what must be the maximum pressure of the steam, its physical condition, the factors that promote rapid heat transfer, and the recovery of whatever heat it removed in the exhaust steam or hot water and in the vapours. All these problems have been brought prominently to the notice of chemical engineers through the fuel efficiency campaign of the Ministry of Fuel and Power.

It is in respect of those liquids that cannot be vaporised by steam alone that the literature is singularly innocent of any real information and where modern technique has secured valuable advantages. The system whereby a vessel was heated from the outside by direct means is frequently not very efficient and tends to lead to decomposition of liquids of high boiling point. Tar distillation and petroleum distillation in particular may suffer through prolonged exposure of the liquid being distilled to the rather considerable temperatures needed for vaporisation. Externally-heated stills tend to promote decomposition partly because the tar or petroleum may be overheated against the sides of the vessel and partly by reason of the duration of heating which may last for many hours. (*Continued overleaf*)

On Other Pages

It is common knowledge that this system of heating has been replaced in the petroleum industry by the pipe still, which, as a matter of historical accuracy, was first devised for the distillation of tar. The pipe still is also now taking its place in the tar industry and it seems probable that in the future the good old pot still will be regarded as out of date.

In a paper recently published by Dr. G. Baars and read before the Institute of Petroleum and the Institution of Chemical Engineers, an account was given of the difficulties that are experienced in the design of a pipe still. In effect the pipe still consists of a number of tubes arranged in banks at the outlet of the furnace, which are primarily heated by convection, with a further number of tubes arranged around the combustion chamber of the furnace which are heated mainly by radiation. The liquid flows through each tube in series, the tubes being connected by suitable bends. The general design of the furnace is similar to that for a water-tube boiler and the objective must be to transmit as much as possible of the heat generated by the combustion of the fuel to the oil flowing through the tubes. A certain amount of waste heat escapes which can be put to useful purpose just as in a watertube steam boiler.

The real difficulties in calculation occur during the passage of the oil through the tubes. The oil will probably be preheated before entering and will enter in the liquid condition. After traversing a certain number of tubes vapour will begin to form and the mixture of vapour and oil in the form of foam travels forward. Foam is a dangerous condition because droplets of oil may be overheated and decomposed on coming into contact with the wall of the tube. Foam quickly gives way to mist as the amount of vapour increases and it is probable that ultimately the mist will be wholly converted into vapour before leaving the tube. It would, of course, be possible for the oil to be completely contained in the liquid condition by keeping a sufficient pressure on the tubes. In tar distillation, since the pitch cannot be completely vaporised without decomposition, the condition of complete vaporisation will not be reached and it is likely that little more than half the tar will be vaporised in the tubes. The liquid flows turbulently in the tubes, thereby promoting rapid heat transfer with the minimum tendency to cling to the sides of the tubes. The very rapid passage of the liquid through the tubes and the turbulent flow together reduce decomposition to a minimum so that the yield of useful products is generally greater from a pipe still than from a pot still.

Dr. Baars's paper is confined wholly to the use of the tar still for petroleum distillation and his object has been to draw attention to a subject regarding which little information is to be found in technical literature. It is always interesting in these days of intensive research into any and every subject to find one upon which there is comparatively little information available to any but the specialists.

NOTES AND COMMENTS

China Clay Prospects

AS an antidote to all the frequent reminders of dwindling resources and short supplies, the Board of Trade's current report on one traditional raw material in this country, china clay, is sufficiently encouraging to remedy some of the well founded doubts entertained about the utility of Working Parties in general. The review issued this week (H.M.S.O., 2s. 6d) is, like most recent surveys of the same kind, somewhat out of date, most of the information relating to the years prior to 1947; but as the china clay industry is not subject to sudden fluctuation, the evidence is not falsified by the passage of a year or two. This Working Party has at least focused attention on the existence in comparatively small areas of Cornwall and Devon of almost inexhaustible reserves of hydrated silicate of alumina (Al_2O_3, $2SiO_2$, $2H_2O$), which few countries possess in comparable qualities or quantities and most are anxious to buy from us as an indispensable requirement of their paper, pottery, rubber, paint and electro ceramic and refractories industries and as an important contributory to chemical, pharmaceutical and cosmetic production. Pottery, in fact, accounted for less than half as much china clay used here in 1947 as went to the production of paper, and 16 other industries, most of them based on chemical processes, drew essential supplies from the Cornish and Devon workings. Best of all, perhaps, is the evidence that the U.S.A., in the past second only to this country as a producer of china clay, was also our best customer and would almost certainly make available a substantial supply of dollars could we increase our shipments. As our second largest raw material export in quantity and value in the past—when coal was our first—and as a means of reducing some of our own most acute shortages the china clay industry deserves all the encouragement that more coal and labour and fuller mechanisation could provide.

. . . and Peat

AMPLIFYING the present picture of the prospect of widened supplies for some departments of the chemical and allied industries comes the news that the Scottish authorities are at last to take the initiative in promoting a large-scale development of that most abundant of all raw materials—peat. Like the full development of the South-West's china clay, the benefit of the contribution of fuel, tar oils, wax, fertiliser, and alcohol, and the other important chemical materials which the vast peat beds of the North might yield are not likely to materalise without long and arduous pioneering effort, scientifically controlled, and a great deal more mechanisation and research than has yet been given to peat. That seems to preclude any immediate prospect of substantial returns, but in the present critical conditions affecting nearly all raw material supplies the desirability that the necessary effort and investment should be made will be generally admitted, except by some Scottish agricultural interests, who are not impartial judges of the competing claims of industry and sheep farming. In the preliminary announcement of the intention to create a Peat Development Board it was implied that the first objective would be to amplify the scope of the new hydro-electric undertakings by providing fuel where water power is lacking. Useful as that objective is, it is no less important to ensure that future effort is not confined to producing a second grade fuel and permitting a substantial quota of important chemical material to be scattered on the winds by power house chimneys. Some aspects of the chemical and fuel potentialities of peat form the subject of a review, to be published in our next issue, by an expert in the North whose recent work now commands a special interest and, we believe, shows more enterprise than the current study which the DSIR has produced.

Prediction

DEVOTED as one may be to Sherlock Holmes, one's credulity is still liable to be affronted when simplified deduction of somewhat the same variety is applied to chemical engineering problems. It may therefore require a very open mind indeed to accept in its entirety the new principle of estimating future repair charges for chemical plant lately revealed to the American Institute of Chemical

Engineers. The system is, on the other hand, much simpler than clairvoyance and does not bring the practitioner within the scope of the Witchcraft Act. Future repair costs for any given type of chemical plant, says Mr. David E. Pierce, chemical engineer of the General Aniline and Film Corporaton, of New York, can be predicted for "any period of activity of the plant" by direct reference to the amount of electrical energy consumed. During the course of Pierce's studies, which took a number of years—relates the official report of the conference at which this remarkable revelation was presented—actual repair costs were charted in relation to any number of variable factors, including "the number of meals served in company cafeterias." The number of hamburgers presumably threw no useful light on the problem, but the kilowatts did. "The kilowatt hour of electricity was taken as the common denominator of plant activity and Pierce has evolved a theoretical repair cost which includes a labour index and material index, kilowatt hours consumed and overhead per man-hour." To us the most extraordinary thing about this exercise in costs accountancy by the notched stick method is that among those who collaborated were such firms as the Calco Chemical Company, Goodrich Tyre and Rubber Company and Monsanto.

An Overdue Annual

STATISTICS, as current affairs often remind us, are not infallible. Yet in their own limited field of application they are indispensable. Hence the cordial reception which has been given to the reappearance of the Annual Abstract of Statistics (H.M.S.O., 10s. net), the 84th in the series compiled by the Central Statistical Office in collaboration with other Government departments, of which the last made its appearance in 1940—when statistical records of most civilised activities seemed to have become meaningless. The latest volume deals with the years 1935-46 and represents an essential work of reference to the increasing number of people who have to relate overall figures to individual problems. The value of the present volume is enhanced by the fact that it makes easy the comparison of pre-war and post-war figures and, since the Abstract was first published in 1856, the present volume closes a gap in a long chain. It is often not sufficiently realised that statistical deductions of any real significance can only be established by examining a series of figures covering a number of years. The more recent practice of comparing monthly or weekly figures, frequently encountered in Government "handouts" to the Press, etc., is apt to be misleading. The contents are presented under 12 headings; the first four sections deal respectively with Area and Climate, Population and Vital Statistics, Social Conditions, and Education, followed by a section on Defence; Labour statistics are contained in Section VI. Sections VII-IX are concerned with Production, Trade, and Transport and Communications; Public Finance, the National Income and Expenditure, Banking, Insurance, etc., and Prices, form the subjects of the remaining four sections. The chemist will find useful, and occasionally essential, information in practically every section of the Abstract; in particular, in the tables devoted to raw materials (section vii), containing figures on production, consumption and stocks of chemicals, fertilisers, rubber, plastics and materials for plastics. The tables concerning foreign trade contain analyses both of the value of imports and exports and of the principal articles entering our foreign trade. Other information of interest to the chemist and chemical manufacturer includes average weekly earnings and hours of work in the chemical industry, employment and unemployment figures, statistics relating to the industry's fuel consumption and use of power. The survey also provides corresponding data of the allied industries, petroleum, iron and steel and non-ferrous metals.

GAS NATIONALISATION

IN his address to the ordinary general meeting of the Liverpool Gas Co. at Liverpool last week, Lt.-Col. Albert Buckley, chairman, said he saw no reason to amend his views and objections to the Bill to nationalise the gas industry.

Of the Bill's proposal to abolish the co-partnership movement in the industry, he said: "Such a step will bring to an end a profit-sharing association which had existed between many gas companies and their employees for many years and which has done much, through its contacts, to engender the spirit which will be so essential in a nationalised industry."

Petroleum Chemicals

Display of Forthcoming Developments

CHEMICAL products from the petroleum industry, despite their established position in the past in such fields as fuels, drugs, pharmaceuticals, paints, etc., have not hitherto been given prominence collectively at the Ideal Home Exhibition. This somewhat surprising neglect has now been remedied by the Manchester Oil Refinery group of companies acting through Petrochemicals, Ltd., which has brought the entire story of petroleum to the visitors' view at its stand in the Grand Hall, Olympia. It does so in five " chapters " by means of photomontages, maps, charts, models, photographs, and appropriate descriptive text.

Catarole Process

The large-scale production of chemicals from petroleum is based on the availability of plentiful supplies of a full range of aromatic hydrocarbons, and olefins, materials from which the finished products ultimately emerge. In this connection, the Catarole process—invented in 1938 by Dr. C. Weizmann, and developed during the last ten years—plays a unique part by deriving the aromatic hydrocarbons as well as the olefins from the crude petroleum. Its importance is more readily appreciated when it is remembered that it dispenses with the laborious " cracking " and fermentation process formerly necessary for the production of olefins, and the manufacture of the aromatics previously produced from coal tar by less direct methods.

Full-scale production by M.O.R. has not yet commenced, but the plant which is at present under construction at Partington, Cheshire, will be ready for partial operation before the end of this year. Ultimate production is estimated at about 75,000 tons per annum. Capital investment, states the company, is equivalent to £3000 for every worker employed.

The possibilities for chemical expansion to be opened up by the impending developments are stated by experts to be limitless. Vast new fields of fine and organic chemicals can then be explored without the restrictive effects of material shortages.

The principal products for which production is scheduled include the following: Pure grade and nitration grade benzene and toluene, 3° C. and 5° C. xylenes, *o*-, *m*-, and *p*-xylenes; alkyl benzenes (heavy naphtha), purified white naphthalene, methyl, dimethyl and trimethyl naphthalenes; high purity anthracene, phenanthrene, pyrene, chrysene, acenaphthene, fluorene; pitch for electrode coke; ethylene and ethylene derivatives and intermediates, including ethylene, chlorhydrin (anhydrous), ethylene oxide, ethylene glycol, ethylchloride, ethylene dichloride; propylene and propylene derivatives and intermediates, including propylene oxide, propylene glycol, isopropyl alcohol and acetone; butadiene, butenes and derivatives; styrene and polystyrene.

The molecular structure of each product is being shown at the exhibition by means of models, and applications are symbolised by a display of some of the manufactures in which these organic chemicals are used.

(Continued in next column)

Peat Development

Scottish Board to be Formed

CONFIRMATION of the intention to create a Peat Development Board has been given in Edinburgh at the annual general meeting of the Electrical Association for Women. The North of Scotland Hydro-Electric Board, it was announced, is to consider the use of peat on a large scale for power production and would also have to consider by-products such as chemicals, wax, and similar products. This confirms indications already given that development of peat on a large scale was planned in Scotland.

Mechanised handling of peat on the largest possible scale, as in Denmark, Holland, Russia and Canada, has been advocated for some considerable time as against the limited hand production methods which have so far applied in Scotland. Opposition to mechanised large-scale cropping has been largely dictated by economic factors. The cost of installing railways, mobile conveyors, diggers and other necessities discouraged the Government so long as coal remained generally available.

The factors influencing expansion now are the need to create electrical energy in areas where there is no hydro-electric resources, but where peat abounds. The extraction of chemicals from peat is included as one of the objectives, but appears at present to be regarded as of secondary interest.

The bulk of peat cropped in the past has been used for horticultural purposes, as stable litter, and more recently for the manufacture of wall boards. Some experiments have also been attempted in the manufacture of paper. Assuming the large-scale development now indicated, it is expected that such by-products will also be expanded. The probable constitution of the new body will involve grouping of all the interests at present working in this field rather than the creation of a large-scale Government-controlled organisation.

New Superphosphate Group

Influential Backing for Manufacturers' Association

A DEVELOPMENT likely to bring about further integration of firms and individuals associated with the artificial fertilisers industry is the announcement of the formation of the Superphosphate Manufacturers' Association. Its objects are " to promote the consideration and discussion of all questions affecting the trade and interests of persons engaged in the manufacture of superphosphates, etc." Management is to be vested in a committee, whose members have not yet been named.

The names of a number of influential persons and organisations in the fertiliser industry appear in the list of subscribers. They include: Mr. D. J. Bird (Fisons, Ltd.); Mr. W. B. Davies (Lawes Chemical Co., Ltd.); Lindsay & Kesteven Chemical Manure Co., Ltd.; Farmer's Co., Ltd.; W. & H. M. Goulding, Ltd.; Richardson's Chemical Manure, Ltd.; Scottish Agricultural Industries, Ltd.; West Norfolk Manure & Chemical Co-op. Co., Ltd.; Geo. H. Anderton, Ltd.; Edwd. Webb & Sons (Stourbridge), Ltd.; Sheppy Glue & Chemical Works, Ltd.; R. & J. Garroway, Ltd.; and Eaglescliffe Chemical Co., Ltd.

HILGER-WATTS MERGER

TWO important scientific instrument makers, Adam Hilger, Ltd. (1874), and E. R. Watts & Son, Ltd. (1856) announce that they are to merge into one company to be known as Hilger & Watts, Ltd. Both companies have enjoyed a world-wide reputation for their products. A joint statement emphasises the advantages that are expected to accrue from the combined resources of research personnel and equipment.

The board is to be constituted as follows: Mr. G. A. Whipple (managing director of Watts (1939) and Hilger (1946) chairman and managing director; Mr. F. Twyman, technical adviser; Mr. A. C. Menzies, controller of research; Mr. D. R. Stanley, controller of sales; Mr. V. W. H. Towns, technical controller and Mr. R. H. Watts, assistant controller of sales.

A high proportion of the company's products is for export, and overseas sales will be the responsibility of Scientific Exports (G.B.), Ltd. (SCIEX) and British Engineers' Small Tools and Equipment Co., Ltd. (BESTEC). Existing factories number six—another has been planned for the London area—employing at present 1300 people.

Research in India

Announcement of Government Plans

THE establishment of an electro-chemical research institute in South India with the Rs.1.5 m. donation made by Dr. R. M. Alagappa Chettiar, plans for setting up a Central Institute for Drug Research, and preparations for founding a synthetic petrol industry in India, were among a number of proposals adopted by the Council of Scientific and Industrial Research which has met in Delhi, under the presidency of Pandit Nehru. The Council also considered a draft Bill for governmental control of atomic energy development and disposal of the raw materials.

Coal and Petroleum

Simultaneously with the manufacture of synthetic petrol, the Council decided that intensified geological and geophysical exploration of possible areas of occurrence of petroleum in India should be carried out. It was also recommended that the possibility of buying crude petroleum from the Iranian and Burma oilfields and refining it at two or three refineries at Indian ports should be explored.

On the recommendation of the Fuel Research Committee, approval was given to the establishment of three field survey stations for coal research in the Central Provinces, Raniganj, and the Bokhro-Rajgarh coalfields at a cost of Rs.900,000. It was also decided to have detailed plans prepared for carrying out work on underground gasification of coal.

To promote development of dyestuffs, the Council agreed to provide additional funds to Bombay University for the creation of a Professorship in Dyestuff Technology and for the institution of six research fellowships.

The electro-chemical research institute will be in the chain of India's national laboratories which will be established through the efforts of the Council. Five of these national laboratories are under construction and proposals are under way for the establishment of a Leather Research Institute at Madras, Road Research Institute at Delhi, and a Building Research Station at Roorkee.

Ceylon Steel Scrap Plans.—The Ceylon Government proposes to convert all scrap available in the island to steel. A scheme for this purpose has been prepared by John Miles and Partners and a factory will soon be established for the purpose. A ban on export has kept most of the scrap in the island, which might otherwise have gone to India.

Report on Streptomycin

Use in Tuberculosis Treatment

IN his report for the year 1947 to the South-eastern Counties of Scotland Joint Sanatorium Board, Dr. H. A. Murray, medical superintendent of East Fortune Sanatorium, discusses the use of streptomycin in the treatment of tuberculosis and its effect on a number of patients admitted to Bangour Hospital.

Dr. Murray states that all that can usefully be said at this stage is that the drug has more effect than any previously tried in reducing the activity of acute lung disease. Some patients with miliary disease may be saved and, if the drug is administered in early treatment, some patients now suffering from tuberculosis meningitis may be kept alive, although recurrence of the disease may occur.

Dr. Murray emphasises that, while no fixed pronouncement on this use of streptomycin can yet be made, the drug is by no means a simple and generally applicable form of treatment for tuberculosis. Its final use would probably be limited.

HIGHER COAL STOCKS

A SURVEY of officially-compiled figures relating to coal stocks as at February 14, 1948, shows that industrial consumers were in possession of considerably higher stocks on that date than at February 15, 1947. The figures are as follows (those in parentheses relate to equivalent weekly consumption):

	(*Thousand Tons*) 14 Feb., 1948	15 Feb., 1947
Iron and steel	911 (4.3)	230 (1.2)
Engineering and other metal trades	707 (7.3)	148 (1.3)
Coke ovens	807 (2.0)	402 (1.0)
Other industry	3893 (5.7)	935 (1.3)

Coal stocks at utility undertakings compare thus:—

Gas	2198 (4.0)	857 (1.6)
Electricity	3389 (5.0)	1076 (1.7)
Water	110 (12.9)	67 (7.8)
Railways	844 (2.8)	233 (0.8)

More Linseed Crops Urged

Speaking at a meeting of the Farmers' Club in London this week, Prof. G. E. Blackman, director of research on new crops at Oxford University, urging farmers to grow more linseed, stated that this country's climate provided ideal growing conditions for the crop. This, combined with improved production methods and economic use of the straw, possibly for paper production, should establish linseed as a permanent and competitive crop in this country.

Sebacic Acid in Germany

Inferior Methods Reported

GERMAN methods of synthesising sebacic acid during the war, says FIAT Technical Bulletin T-1, were found to be inferior to the accepted method of using castor oil as a starting material, and were in any case only at the laboratory stage. A literature search covering the reports of previous investigations revealed only one reference to sebacic acid. In BIOS Report No. 266, *New Technical Applications of Acetylene*, it was mentioned that an application of the Reppe process was to obtain sebacic acid from the appropriate cracked or synthetic olefin plus propionic anhydride.

Dr. Walter Reppe, organic research director of I.G. Farbenindustrie A.G., consequently interrogated regarding the subject, stated that research on a laboratory scale had been carried out in an attempt to find a practical method of producing sebacic acid from substitute materials. He mentioned the possibility of making sebacic acid in a manner similar to that used for suberic acid, from acetylene.

This method, however, has not yet been successful. Dr. Reppe also mentioned that hexanediol 1.6 may be synthesised from acetylene and formaldehyde and treated to yield sebacic acid.

EIGHT MORE REPARATIONS PLANTS

THE Inter-Allied Reparation Agency has announced that general-purpose equipment designed for peacetime production of such varied products as vanadium, bearings, lathes, grooving machines and other general-purpose equipment, from eight additional German war and industrial plants will be considered for allocation as reparation among the 18 Western Allied Nations. The plants will be allocated among Allied nations, on the basis of requests for allocation submitted by the respective governments. They include the Ottavi Minen, Blumberg (vanadium), Singen Walzwerk, Singen (aluminium, copper and zinc semi-finished products), and six engineering plants.

Textile Institute Fellows

The Textile Institute announces the election as Fellows of MR. ROBERT WESTON VOSE, director of research and engineering, Fuller Brush Co., Hartford, Connecticut, U.S.A., and MR. WILLIAM WATKINS, director and works manager, Manchester Dyers (1914), Ltd.

SULPHURIC ACID PATENTS

Italian Approach to "Intensive" Production

INTERESTING departures from orthodox principles in the production of sulphuric acid are represented by two recent patent applications by Italians. The first (Eng. patent application No. 25007/1947—open to public inspection), by G. Maragliano-Busseti and L. Pettenati, of Genoa, claims improved methods for sulphuric acid manufacture by a more "intensive" process than has hitherto been employed. They have also recently patented a new process for nitric acid (E.P. appln. 35138/1947).

They note that the usual method for sulphuric acid production consists of four stages: (1) formation of sulphuric acid in chambers or towers; (2) recovery of nitrogen oxides in Gay Lussac towers, liberated during the preceding reaction; (3) liberation of recovered nitrous products and return to cycle; and (4) concentration to about 60° Bé of the acid produced.

Two Phases

In the present invention, using nitrogen oxides as reaction accelerators, formation of sulphuric acid is effected simultaneously with recovery of nitrogen oxides. These oxides are liberated by intensifying the former through the use of large quantities of nitrosyl sulphuric acid and nitrosulphonic acid dissolved in sulphuric acid. Sulphur dioxide at the inlet is thus readily absorbed and a corresponding amount of nitrogen oxide is set free, according to the equation:

$$SO_2 + 2(SO_4HNO.H_2O) = 3H_2SO_4 + 2NO.$$

The nitrogen oxides liberated are almost immediately oxidised to dinitrogen trioxide, which is said to be largely absorbed by acid, while the part not absorbed passes into the gas mixture. By suitable regulation of the amount of nitrosyl acid in contact with the sulphur dioxide mixture and of the composition of the latter and of temperature, the two phases, it is claimed, are effected simultaneously in a smaller space, so that absorption of SO_2 and recovery of nitrogen products is practically complete. The usual type absorption tower may be used and a single container only is required to sprinkle acid in all compartments of the absorption system. Another method may be that of causing acid to circulate continually in single circuit either from the last compartment to the first, or the reverse.

The composition of acids to be sprinkled may be varied within wide limits according to required intensity of the reaction. Circulating gases are maintained at the desired composition by introducing at a suitable point, perhaps in the first compartment, water and nitrous products—the former as liquid or steam and the latter as nitrates or nitric acid.

To facilitate recovery of nitrous products, excessive heat of reaction must be reduced by suitable cooling, as, for example, by circulating acid. The temperature should not exceed 50° C. at the end of the absorption system. In other parts it may vary from 30° to 100° C. and output may be correspondingly varied.

Another feature of the process described is that acid to be converted in the final product before denitration must be diluted. Denitration is effected with heat or sulphurous gas. If hot SO_2 is used, from roast pyrites for instance, this too must be cooled, with the possible recovery of some of the heat. It is claimed that output may reach 200-300 kg. per cu. m. of absorption space. For each mol. absorbed, SO_2 not less than 5 mol. nitrosyl sulphuric acid is used.

Catalytic Method

Another improved method for the production of sulphuric acid is claimed in Eng. patent application No. 34960/1947 by Pietro Guareschi, of Genoa, using the catalytic process and a much simplified plant. It is pointed out that hitherto a large number of absorption towers and high consumption of fuel have been necessary. In the present invention gases from burnt pyrites (sulphur dioxide, oxygen, steam), after elimination of arsenic, are liquefied in suitable compressors, or the dioxide only is liquefied if a separate source of oxygen is available.

The gaseous mass, previously reduced to a mixture consisting principally of sulphur dioxide, is led into a high efficiency heat recovery device of the powdered pyrites furnace, and the temperature is reduced to 450-480° C. Owing to the greater concentration which results, the contact reaction gives better output, and the volume of gases involved is much reduced, *i.e.*, by about 20 per cent.

If both the sulphur dioxide and oxygen are liquefied, a much smaller contact chamber is needed and the catalytic efficiency is increased. The bulk of hot gases is led through the catalyst and converted to sulphur trioxide, which in turn is absorbed by sulphuric acid in suitable towers or chambers. The trioxide may be either liquid or solid.

FRENCH OILSEEDS INDUSTRY—II*

All Interests Closely Integrated

By a Special Correspondent

A SIGNIFICANT portent of the wide and efficient development in the future of the production, distribution and efficient processing of French oilseeds is the increasing degree of integration of all the parties concerned, the Government, growers and technologists.

During the war the Government actively assisted and directed oil seed cultivation and the oils and fats industry in general. To-day, many of the organisations formed then continue in a modified, voluntary and consultative capacity. The interests of the Association of Oil Seed Producers (A.G.P.O.) are represented at the Ministry of Agriculture and on other co-ordinating committees. It has a co-operative basis and its main function is the study of soils and the improvement of yields, and it co-operates closely with the Agricultural Research Stations.

The distribution of seeds for sowing, the establishment of standards for oil crops, the collection and supply of information to central store houses, the control of special harvesting equipment such as the grape seed separators, the efficiency of olive mills and similar subjects are in the care of an inter-professional committee for Metropolitan oilseed interests (G.I.C.M.).

The large and medium-sized oil mills are organised in four regional syndicates forming the Union of French Oil Mill Syndicates, and the small mills are formed into a separate national crafts organisation.

Central Buying Agency

The buying of home grown and imported oil seeds is carried out by yet another agency—The National Purchasing Commission for Oleaginous material (G.N.A.P.O.).

The most important of these organisations, however, is the Technical Institute for the Study and Research of Oils and Fats (I.T.E.R.G.), which was created in May, 1943. Among its principal objects are :—

(a) To study and direct research and development work for the whole field of the oils and fats industry and to advise the industry on improved and new processes.

(b) To undertake scientific and technological research itself on problems of general interest to members and to create a central technical information bureau.

(c) To examine and recommend manufacturing methods and to advise members of detailed process practices.

(d) To introduce standards wherever practicable, particularly in the analysis of materials and the unification of technical terms.

(e) To assist in the technical training of specialisis at all levels of the industry, to keep them in touch with modern developments, and to provide means for their further professional education.

The implementation of these aims requires a very close co-operation between firms subscribing to the Institute and an almost complete breakdown of the barriers put up by the secrecy with which most companies surrounded themselves. Detailed production costs, for instance, were worked out by officers of the Institute in various oil mills and circulated among interested members. This usually resulted in heightened efficiency all round. There is no doubt that it now forms a very powerful instrument for the modernisation of the French oils and fats industry.

Functions of I.T.E.R.G.

The Institute, on a voluntary basis since June, 1946, is financed by the members, who subscribe one-thousandth of their annual business turnover. It is significant that with the exception of a very few giant concerns, no firm has resigned its membership. The Institute is recognised by the Ministries of National Economy, of Industrial Production and of Food as the representative body of the oils and fats industry.

The services of the Institute under the able direction of its energetic Director-General J. P. Sisley, include a complete information, translation and abstracting bureau, the publication of a monthly journal and a bulletin, provision of a research laboratory and a pilot plant station, and of recognised courses in oils and fats technology by university professors and representatives of the industry, and visits of missions to Germany, U.S.A., etc., to study foreign developments. Excellent reports on these are circulated to all members.

It is too early to say how this very courageous attempt to provide an efficient instrument for the modernisation of the French oils and fats industry will fare in the future, but, judging from its solid achievements so far, it seems likely to extend its activities and become an example to its counterparts in other countries.

The foregoing briefly summarises the sources and the agencies responsible for the production, distribution and processing of

* The introductory part of this review appeared in THE CHEMICAL AGE, February 21, p. 266.

French vegetable oils and fats; it remains to discuss briefly some of the more important technologies.

In the production from seed there has been a steady tendency over the last 20 years to abandon the hydraulic press and replace it by the continuous screw press or by solvent extraction, both of which require less manual labour. The exceptions where the hydraulic press is still in use occur when it it required to obtain virgin oil which must not be further refined, or in the case of the double pressing copra, which yields an oil that is particularly appreciated by margarine manufacturers since it refines and hardens easily, or in the production of linseed oil.

Double pressing in continuous screw presses, which is widely practised in France, yields a cake containing 6-8 per cent of oil, which is about the same as from hydraulic presses, but production costs are lower. Solvent extraction yields a meal containing 0.5—1 per cent of oil. Seeds rich in oil such as groundnut, copra, sesame, etc., are usually pre-pressed before being extracted. It is also becoming increasingly popular to press linseed only once and to solvent extract the cake. The direct extraction of linseed is also carried out in a few factories.

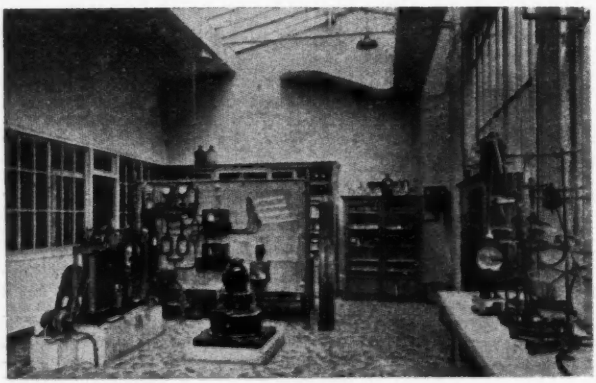
Before being pressed, the seeds have to be cleaned and in some instances decorticated as well. Decorticators are supplied by Terrin, Samat, Egrot and Olier. The next operation is milling and flaking. Little progress is possible with the traditional roller reduction mill and completely encased machines to reduce dust formation have apparently not yet been introduced. For linseed, the 5-high roller mill is usually employed, while palm kernel, copra and shea nuts (Karité) have to be broken down before milling. The home-grown seeds of the colza type are milled in 2-pair roller reducing mills.

Concerning continuous screw presses it is interesting to note that practically all the French oil mills work on Olier or Egrot presses, though a few Smulders and Krupp presses are also employed. Since the liberation, a few American Anderson expellers have been ordered and the results of their operation under French conditions are awaited with interest. Influenced by modern developments abroad, Olier has developed its new screw press "Titan" which is intended to deal with 650 kg. per hour of a material rich in oil, and to yield a cake by single pressing, containing only 4-6 per cent of oil. Whether the high expectations of the makers of this press will be fulfilled, cannot yet be confirmed, since no machine has been sufficiently long in operation for a completely reliable picture to be obtained.

Solvent Extraction

Although solvent extraction is relatively widespread, apparatus is often somewhat out of date. One reason for this is that many French solvent extraction plants were installed many years ago, long before this method of extraction became popular in other countries, and many of the old extraction plants are still in good condition. They may not work with the same efficiency as modern plants, but the difference is often not sufficiently great to warrant expenditure on new plant.

Conservation of old plant is moreover encouraged because the quality of the solvents has greatly improved over the last two decades, thus improving the apparent efficiency. Petroleum ether boiling between 60°-80°C. is most widely employed. For the extraction of grape-seed the non-inflammable trichlorethylene has become the most widely used solvent. Some refiners do not favour trichlorethylene-extracted oils, how



I.T.E.R.G.'s pilot plant station for the study of solvent extraction, selective extraction of oils, manufacture of alcohols and hydrogenation

ever, since this solvent dissolves larger amounts of gummy mucilageneous and colouring matter, which render refining more difficult.

The most usually employed solvent extraction plant is the battery of vertical extractors, of the prototype Koeber. It is used advantageously for soyabeans and palm kernels, also for grapeseed and olive press residues (grignons). Rotary solvent extractors are used particularly by the smaller firms Egrot and Olier are building these in France and some German and Swiss rotary extractors are also in use. There is a general tendency, however, to use continuous extraction, wherever the daily quantity of material treated is sufficiently large to warrant the relatively heavy capital investment, and provided that the same type of seed is regularly available.

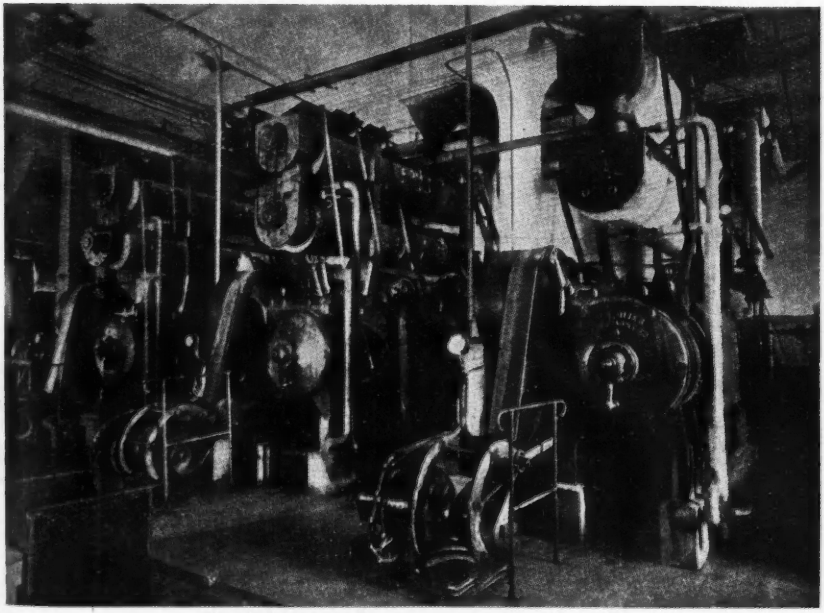
Continuous solvent extractors of French design are built by Olier, which has supplied several installations, and by Egrot who so far have only installed one continuous extractor. The Olier extractor has a capacity of 50-75 tons of raw material, containing 18-20 per cent of oil per day of 24 hours. It consists essentially of a vertical column fitted with a central rotating agitator shaft. The material to be treated is fed from above and descends over a system of perforated conical baffle plates in countercurrent to the miscella.

The bottom of the column is fixed to a totally enclosed slightly inclined bucket elevator, which lifts the partially extracted material, which is being sprayed by solvent injected just under the top discharge end of the bucket elevator. The meal is stripped in a series of steam jacketed tubes from adherent solvent.

The strong miscella overflowing at the top of the extraction column is filtered, concentrated in a multiple evaporator and then continuously steam-stripped in a column. The Egrot extractor is somewhat similar in principle, but the extracted meal is freed from solvent and dried in rotary jacketed drums of the same construction as is used for rotary extractors. This enables vacuum operation. Filtration and concentration of the miscella and the final deodorising of the extracted oil is again similar to the Olier process (10).

There are several Hansa-Mühle plants in operation. They are somewhat more complicated in design than the French models and it may take somewhat longer to master their operation.

(To be continued)



Three Olier continuous presses for oil seeds

RESEARCH WITH 1M. VOLTS

New Aids to U.S. Atomic Studies

PHYSICISTS of Yale University have already procured energies of one million volts in a new, atom-smashing, linear accelerator which is expected to reveal new secrets of the atom. This news comes from Prof. Howard L. Schultz, assistant professor of physics, who directed construction of the linear accelerator in collaboration with the associate professors of physics.

Instead of using heavy particles of matter to smash the atom, the linear accelerator works on the principle of using the electron —the light, negatively charged particle of the atom—to smash the nucleus. It builds up to the speed of light (186 million miles per second), and is powered by high-frequency amplifiers.

The method of operation of the linear accelerator is the firing of electron particles in a straight line through a series of "pill boxes" made of steel and lined with copper to provide maximum conductivity. These pill boxes, termed "cavity resonators," connect with high-powered amplifiers and the flow of electron particles from a single external source is synchronised by a master amplifier. Other linear accelerators now in existence have to depend on individual self-excited oscillators and require high machining tolerances so the pill boxes fit together exactly. The heart of the system, the pill box, is relatively inexpensive.

Professor Schultz and his aides are now building a pilot model at the Yale Sloane Physics Laboratory which is expected to produce energies of from 15 million to 20 million volts by June of this year. The series of pill boxes will measure from 5 ft. to 6 ft. in length.

In operation the pill boxes are evacuated of air and this vacuum is maintained during all experiments. An "electron gun," in the form of a high-voltage vacuum tube, emits streams of electron particles into the pill boxes which start at relatively low speeds of 5000 volts and build up to multi-million voltages depending on the number of pill boxes which are used.

Four Major Problems to be Attacked

Four major problems in fundamental nuclear physics will be explored at Yale, using the linear accelerator as a tool They include :

1. The accelerated electrons will be used to produce nuclear transmutations—the complete conversion of one element into another —and the new products will be studied.

2. The entire problem of just how a fast electron behaves when it is passing near the nucleus of an atom is an unknown factor. The forces which emerge from this reaction are neither electrical nor gravitational in character, but have energies many million times such forces. How does the electron get out of the nucleus is one of the problems to be studied. Also, what are the peculiar fields of force?

3. When a fast electron is stopped suddenly, X rays or gamma rays are produced. Theoretically, billion-volt X-rays can be produced by the linear accelerator which will be extremely useful in nuclear studies.

4. The Yale instrument may answer an important question of science : How are fast electrons absorbed in matter?

REVISED CEMENT STANDARDS ISSUED

NEW editions of three British Standards for cement have recently been issued. The standards specify the composition of the various cements, sampling procedures and tests of fineness, chemical composition, strength, setting time and soundness.

The test for fineness has been revised to provide for testing alternatively by sieving or by the determination of the specific surface. Alternative methods for testing the strength are provided, excepting high alumina cement, which is confined to compressive strength testing only. It has been necessary to re-introduce the tensile strength test for the time being owing to the fact that only a small number of reliable vibration machines are available for carrying out the compaction of mortar cubes for the compression test.

The appendices of each specification set out the details of the methods of testing and describe the apparatus needed, including a description and photograph of the vibration machine for the compacting of mortar cubes for the compressive strength test. Copies of these British Standards are obtainable from the British Standards Institution, Sales Department, 24 Victoria Street, S.W.1 (3s. 6d. each, post free). Their titles are B.S.12 : 1947 Portland Cement (Ordinary and Rapid-Hardening), B.S.146 : 1947 Portland - Blastfurnace Cement (not exceeding 65 per cent Blastfurnace Slag), and B.S.915 : 1947 High Alumina Cement.

Metallurgical Section

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METAL CLEANING PROCESSES—II

Uses of Alkaline Solutions

by L. SANDERSON

ALUMINIUM, brass, tin, zinc, and copper, as well as a number of other metals, cannot be cleaned with alkaline solutions because they are readily corroded or stained. Aluminium and its alloys can, however, be cleaned in these solutions if an inhibitor is included in the composition of the cleaner, but even so, a great deal of care will be required. Generally, however, all these metals should be cleaned with a non-alkaline cleansing agent.

For some applications, however, the alkaline solutions have advantages, as in electroplating, in which the surface to be plated must be chemically clean. Here the final operation should be with an alkaline cleaner, even though a degreasing or an emulsifying agent may have been previously used.

Alkaline cleaners have probably wider application than any other; there is not much they cannot do. A specially useful application is to the cleaning of intricate hollow parts of considerable dimensions. Here a series of sprays can be provided to ensure that the alkaline solution is so distributed under pressure that it removes the foreign matter from the least accessible areas. In this it excels both the solvents and the emulsifiers.

When chemically clean surfaces are not essential a degreasing agent can be used instead provided very full treatment is given.

Types of Solution

Caustic soda is probably the least expensive of all the alkaline solutions, but it has many disadvantages. Compounds of caustic soda are also employed, and in addition there is a variety of salts and compounds varying in alkalinity, and of very varied applications.

It must be remembered that in addition to alkaline action, any metallic surface carrying grease, fat, or mineral oil must be wetted before these materials can be removed to the desired extent. This wetting cannot be achieved by a simple alkaline salt alone, so that a type of synthetic wetting agent must be added, together with a soap. To ensure adequate performance of cleaning and emulsification, this soap should be in colloidal condition.

The *p*H usually required for metal cleaning is from a minimum of 11.0 to a maximum of 13.0, but the ordinary scap at such a *p*H cannot retain the colloidal condition, and a special type of soap must be employed.

When metallic parts have been hardened by quenching in oil, or when they have been heavily oiled to safeguard them against rust, it becomes essential to use a heavy duty alkaline cleaner, and it is possible to obtain special types for this work, embodying added materials designed to promote effective operation.

Special Solutions

While most cleaning work is performed by a comparatively small range of standard alkaline solutions, many jobs call for solutions made of specially blended constituents. It is impracticable, therefore, in this article, to detail each and every variety of alkaline cleaning agent.

Wherever inadequate results are obtained from a standard alkaline solution, but it is desired to continue with the alkaline process, the best plan is to perform a series of tests on the kind of material to be cleaned, endeavouring to make the test conditions conform as closely as possible to the actual cleaning operation. The manufacturers of such solutions will usually co-operate in determining the most suitable solution. Tests of this type are usually required for alkaline cleaners only; the vapour and solvent degreasing solutions and emulsifiable cleaners are fewer and their potentialities fairly well known.

Metals that have been drawn or stamped are generally found to possess a layer of lubricant and dirt. Such parts are best cleaned with an alkaline solution even though the chemically clean surfaces are not essential. Such parts, if not made of aluminium or zinc, are best dealt with by a non-caustic solution. This has a quick and efficient emulsifying action on mineral

oils and greases found on drawn and stamped parts.

Cleansing agents of this type are furnished in large white lumps, easily soluble in water, and they make up a solution having a considerable service life. They will retain large amounts of dirt in suspension before they begin to lose their power.

The solution can be quickly washed off when the operation is finished, and there is no tarnishing effect on steel, brass or copper. No foam is produced, and therefore the solution can quite satisfactorily be employed in a washing machine. The concentration used is 1 oz. per gallon of water.

For aluminium, zinc, and their alloys, however, the *p*H at which this solution functions is too high, but no difficulty of this kind is experienced with magnesium alloys. Forgings, stampings and drawn parts are commonly cleaned with this kind of solution. If the production rate is not high enough to render economical the employment of mechanical washing, a modified solution of the same type is employed in tanks, and prepared at the concentration of 3 oz. per gallon. Steel must be cleaned at a temperature in the region of the solution's boiling point. Brass should be cleaned at about 70°C.

Deep-Drawn Work

When metallic parts have been deep-drawn, they present so much difficulty in cleaning that a single processing in alkaline solution is inadequate. The parts are drawn at so high a temperature that a metallic soap is formed from the fatty lubricant, and this is extremely hard to remove. When sulphonated oils have been employed in the drawing operation, a single alkaline washing will again fail to eliminate these satisfactorily.

Should the work not be cleaned and later despatched to the annealing stove, the annealing operation sets up a reaction between the foreign matter and the metallic surface, with the result that the structural condition of the surface of the metal is modified. This dirt must therefore be eliminated before any deep-drawn work is annealed between the various stages of drawing.

When a chemically clean surface is essential, alkaline solutions should be employed as the last cleaning agent, but the preliminary and intermediate washings should be carried out with an emulsifiable cleaner, either sprayed on, or tanked so that the work can be immersed in it.

Steel, iron, bronze, copper, brass, magnesium and its alloys, may have to be machined, cut, ground or otherwise worked, using an alkaline solution similar to that employed for drawn and stamped parts. The solution may be kept in tanks or mechanically applied. When steel has been polished on the surface by applying a mixture of tallow and emery, and grinding, it will be inadvisable to use an alkaline solution; an emulsifiable cleaner is preferable.

Aluminium and its alloys call for a special alkaline solution after machining and polishing operations, especially when the material has to keep its initial colour, weight, and dimensions. A cleaner of this type should be used in still tanks at a concentration of 4 oz. per gallon, and at a temperature of 80°C., so as to make sure that the work is properly carried out with no danger of corrosion of its surface.

Zinc can be cleaned in the same solution. The cleaner, when designed for use in tanks, is a yellow powder that flows readily, and is fully soluble. For use in washing machines, the solution is of a somewhat less foaming type.

Die-Cast Parts

In treating die-cast material the type of casting generally determines the kind of cleaning process to be used. Aluminium or zinc alloy die-cast parts require an emulsifiable cleaner. Magnesium alloy die castings can be cleaned with the same solution. It is applied either by spraying or immersion of the work, and it comprises one part of a special ingredient dissolved in ten parts of paraffin or some form of safe solvent. The special material varies with the maker of the solution, and is usually a trade secret. After 60 seconds in the solution, the die castings are thoroughly drained and the part is next rinsed in cold running water or sprayed. If electroplating is to follow the castings must be washed for a further half minute in a special alkaline cleaner intended for metals of soft type, and rinsed in water. Finally, a brief period of immersion in a solution of 1 per cent hydrochlolric acid is given. All other die-cast parts can be adequately cleaned with the emulsifiable cleaner.

Die castings can, of course, be washed or cleaned electrolytically in alkaline solutions, but this takes longer, and always modifies the colour of the metal.

Oil-Quenched Work

After the oil of a quenching bath has been continuously used for a period it is liable to reach a temperature only a few degrees short of the flash point of the oil. Quenching bath fires are not uncommon where whale or other oil is used, and these are usually caused by inadequate cooling of the bath. The result of these high tem-

(*Continued overleaf*)

U.S. STEEL PROBLEMS

Poor Quality Coke, Scrap and Ore

THE drop in the production rate of pig iron (in terms of sq. ft. of hearth area per day) by six major U.S. producing companies from 1944 to 1947 ranged from 0.04 net tons to 0.33 net tons, according to data furnished to the American Iron and Steel Institute. The average loss in hot metal production for the six companies was 8 per cent (80 tons per day) from a 1000-ton furnace and was caused largely by poor quality coking coal and scarcity and poor quality scrap of blast furnace grade, the Institute reports. In 1944, the year of maximum pig iron production, the industry consumed 1810 lb. of coke per ton of pig iron produced, and by 1946 consumption had risen to 1868 lb., an increase of 3.2 per cent.

For eleven months of 1947, some furnaces report increases in coke consumption ranging from 2.0 per cent to 9.9 per cent. The ash content of coke has increased by 5.5 per cent to 10.8 per cent, and the sulphur content of coking coals has also risen, with the result that the mechanical properties of the coke, its size, porosity and ability to bear the burden of ore and limestone have deteriorated. This means, says the Institute, that additional limestone must be used to flux off the impurities in the ore, a fact reflected in the statistics. In 1944, for the whole industry, an average of 778 lb. of limestone was used per ton of pig iron produced. By 1946, however, the figure had risen to 812 lb., an increase of 4.3 per cent, and for 1947, some furnaces report that use of limestone has increased by 7.4 per cent.

The increased impurities in coking coal and the increase in limestone consumption decreases the quantity of air which can be blown into a furnace, which in turn reduces the reactions within the furnace with consequent loss of production.

Prices Raised

Associated with these new factors in steel and pig-iron production was the decision last week by all domestic producers of steel to institute price increases of approximately $5 a ton for semi-finished products, including forging blooms, billets and slabs. The move on the part of the steel companies, which is expected ultimately to be reflected in higher prices for a broad range of industrial products from automobiles to small appliances, is attributed to higher operating costs, resulting in the main from increased costs being paid by the steel industry to obtain sufficient raw materials.

METAL CLEANING PROCESSES—II

(*Continued from page* 332)

peratures, even when fires do not occur, is to cause disintegration of the oil, which results in the deposition of a sludge on the tank bottom. Moreover, a proportion of the oil is carburised and becomes unduly acid. This means that any work quenched in the bath takes on a film of particularly tough and adhesive type.

The ordinary cleaning material will not remove these films, so that a heavy duty alkaline solution is required, and must be mixed with maximum care to ensure that it both wets and penetrates to the requisite degree, as well as rinsing like a soap. It must be borne in mind that the number of low titre soaps able to operate efficiently in a solution of this kind is limited.

For this class of work we must, therefore, have a solution of relatively high alkalinity, with the characteristics of a soap. Since hardened work has to be kept rather long in the solution, the ordinary conveyor-type cleaning machine is not desirable. The work is first boiled in the solution for a sufficient period, then given a boiling, soaking rinse in water. The period ranges from a quarter of an hour to three hours depending on the kind and depth of the dirt layer to be eliminated.

The concentration is 8 oz. per gallon, and it is essential that the tank dimensions should be such as to enable the work to be entirely immersed. It is not possible to employ this solution in a washing machine owing to its speedy foaming. On the other hand, it is possible to work out ways of handling the work, giving it tank treatment with boiling solution as a stage in the sequence. Since this solution is highly alkaline, the workers should wear protective clothing.

Aluminium and its alloys are not suitable for this solution, and brass, zinc, lead and tin are all corroded by it. Copper will be somewhat tarnished in the surface, but not corroded. Magnesium alloys suffer no change.

While it is not always possible to eliminate every particle of dirty oil by this method, it is a sound practice to use it because it is economical. If it does not suffice, the work should be immersed for the required length of time at room temperature in a solution of one part of a specially heavy duty cleaner in 8 parts of paraffin.

(*To be continued.*)

SIEVE ANALYSES OF METAL POWDERS

Scientific Studies of Common Variables

ONE of the impediments to progress in the science of powder metallurgy has been the difficulty of obtaining reproducible results in large-scale manufacture, due principally to present methods and techniques introducing numerous variables, as yet not completely understood or controllable. In conjunction with the current programme of standardisation of test methods and techniques in this field, the United States National Bureau of Standards recently undertook an extensive investigation of the conditions contributing to the lack of reproducibility in sieve analyses of metal powders.

Investigations at the Bureau revealed that atmospheric humidity has a marked effect on the results obtained by sieve analyses of metal powders and that controlled atmospheric conditions during sieve testing powders may therefore be necessary when close control of particle size is desired. Increase in humidity, investigations revealed, tends to increase the weight of the fractions retained on the sieves and decrease the weight of the pan fraction. Differences of as much as 10 per cent between the weight of the fractions of powdered iron sieved under high and low humidities have been observed.

Considerable Variation

In sieve tests of sponge iron, electrolytic copper, and nickel, made for the purpose of accumulating supplies of sieved fractions of these powders for other studies, it was found that reproducible results could be obtained only when certain variables were controlled. Significant differences in sieve analysis were often obtained when samples of the sieve powder were sieved at different times with the same sieves. In addition, different sets of certified sieves used for the same powder gave variations of considerable magnitude. A controlling factor, in addition to atmospheric humidity, was a cumulative sampling error that resulted from repeated riffle cutting of limited powder supplies.

The effects of these variables were demonstrated by tests on sponge rubber. This powder was made from reduced mill scale and consisted of irregular plate-like particles. Many of the larger particles were made up of several such plates held together by the oxide of the metal (Fig. 1). The sampling procedure included the use of a riffle-type sample splitter to reduce the entire supply of metal powder (50 to 100 lb.) to "sample supplies" which could be stored in one to five 1-pint Mason jars (3 to 15 lb.).

Bureau tests of the effect of high humidity on the sieving characteristics of sponge iron illustrated the difficulty of reproducible analyses of metal powders. The set of certified U.S. Standard sieves used in these tests, Sieve set 3, included No. 100, 140, 200, 230 and 325. One hundred-gram samples taken from the same freshly riffle cut sample supply were sieved for periods of 5, 10, 15, 20, 30, 40 and 60 minutes after the following treatments of the powder:

Series III.—For each time period three samples were oven-dried for 1 hour at 110°C. prior to sieving.

Table 1. *Sieve tests of sponge iron showing variations due to replacement of sieves Average of 3 tests on 100-gram samples sieved 30 minutes with certified sieves*

	Weight Per Cent Retained								
	Sieve Set I								
Sieve	With original 325 mesh sieve Mean (1)	Deviation from (2)	With new 325 mesh sieve (NBS No. 8887) Mean (3)	Deviation from (4)	Difference from original (3–1) (5)	With new 325 mesh sieve (NBS No. 8888) Mean (6)	Deviation from (7)	Difference from original (6)—(1) (8)	Difference between new sieves (6)—(3) (9)
80	Trace		Trace			Trace			
100	Trace		Trace			Trace			
140	7.3	+.1—.2	7.0	+.1—.2	(—) .3	6.9	+.1—0	(—) .4	
200	22.6	±.1	22.4	+.2—.4	(—) .2	22.6	±.1	0	
325	31.2	+.4—.5	38.2	±.1	(+) 7.0	41.0	+.4—.2	(+) 9.8	(+) 2.8
pan	38.4	+.2—.1	32.0	+.2—.1	(—) 6.4	28.9	±.3	(—) 9.5	(—) 3.1
	Sieve Set II								
80	Trace		Trace			Trace			
100	Trace		Trace			Trace			
140	4.4	±.6	5.2	+.1—0	(+) .8	5.1	0	(+) .7	
200	24.4	±.6	23.5	+.1—.3	(—) .9	23.3	±.1	(—) 1.1	
325	33.0	±.2	38.6	+.3—.2	(+) 5.6	40.8	+.1—0	(+) 7.8	(+) 2.2
pan	37.9	±.2	32.2	±.1	(—) 4.7	30.2	±.1	(—) 7.7	(—) 2.2

Series IV.—For each time period three samples were exposed for 64 to 72 hours to a humid atmosphere in a closed vessel desiccator over water, with wicks dipped into the water to increase the evaporating surface.

Series V.—After sieving, the humidified samples of series IV were mixed, dried for five hours at 110° C., and re-sieved.

For the humidified samples, series IV, the amounts of material retained on each sieve were consistently lower than those of the dried material, series III. Differences in the pan fractions ranged from 3.5 to 6.5 per cent of the original weight of the sample. Part of this difference (approximately 25 per cent) was recovered when the humidified samples were dried and re-sieved. Values for the individual samples of series III lay close to the curve of the plotted results while the values for series IV and V were more scattered. Similar but smaller differences were obtained for the other sieve fractions.

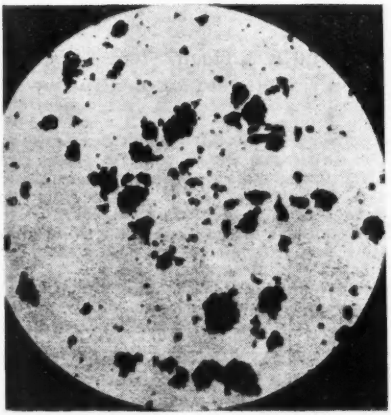
Two additional series of tests were made using the same sieves and the same procedure as in series III, but with samples taken from different sample supplies. The differences between each succeeding series, in the order in which they were riffle-cut, amounted to about 1 per cent of the original weight of the sample. The Bureau believes that these differences were due chiefly to the loss of fines as dust during riffle cutting.

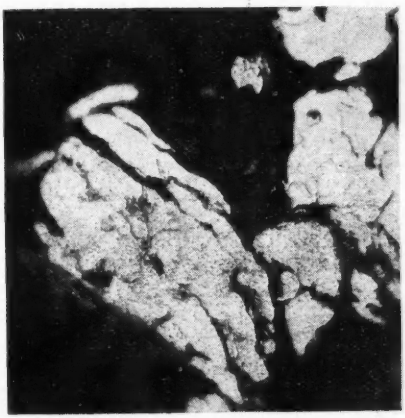
Variations of considerable magnitude also were noted when powders were sieved with different sets of certified sieves. The results obtained with sponge iron when replacements of the No. 325 sieve were made in two sieve sets are given in Table 1. The tests were made under approximately the same sieving conditions and all samples were taken from the same supply.

The fractions retained by the sieves which were not replaced (all sieves larger than No. 325) agreed closely. The new No. 325 sieves retained 7.0 and 9.8 per cent more material respectively with Sieve set 1; and with Sieve set 2, 5.6 and 7.8 per cent. The amounts retained by the two new sieves differed by 2.8 per cent when used with Sieve set 1 and 2.2 per cent with Sieve set 2.

"In connection with these differences," the Bureau reports, "it is interesting to compare the average openings of the several sieves as measured during the certification tests. These measurements are given in Table II. From a plot of the values against measurements of the average openings it is evident that the differences between sieves are considerably less than they would be if the comparison were made on the basis of the nominal opening. The agreement probably would be even closer if the variations in sieve openings could be taken into consideration. Due to manufacturing limitations the dimension tolerances of wire cloth permitted by specification are necessarily rather wide, particularly for fine sieves. These variations are not fully re-

(*Continued overleaf*)





Aids in identifying causes of uncertain reproducibility of sieve analysis, these micrographs show (left) sponge iron powder from mill scale (x 50) consisting of irregular particles, and (right) larger particles (x 500) formed by several of the former cemented by the metal oxide and including areas of pealite

Silver in Industry

Wide Uses in Electrical Equipment

THE extensive and growing uses of silver for electrical equipment were the subject of a review given to the Institute of Metals recently by Dr. L. B. Hunt, manager, industrial division, Johnson Matthey & Co.

Consumption for this purpose in the U.K. alone, he said, amounted to about 200 tons a year, the most important advantages lying in its great versatility as a contact material in such equipment as telephone relays, circuit breakers, and domestic appliances generally. Another important application was in high-rupturing capacity fuses wherein it displayed excellent characteristics of freedom from oxidation, high electrical and thermal conductivities, low specific heat, and low latent heat of fusion.

Other properties of outstanding value to industry were: firm adhesion to ceramics and glass, of particular value in electronic engineering; high resistance to chemical attack. Output of mined silver is at present running at about 6000 tons annually, said Dr. Hunt, as against approximately 8000 tons during the early years of the war.

SIEVE ANALYSES OF METAL POWDERS

(*Continued from page* 335)

flected by the measurement of the average opening."

Further investigations of possible methods of eliminating, controlling, or evaluating the effects of these and other variables encountered in sieve analyses of metal powders are needed and studies toward this end are at present under way at the National Bureau of Standards.

TABLE II. AVERAGE OPENING OF SIEVES AS MEASURED IN CERTIFICATION TESTS.

Sieve No.	NBS Certification No.	Average opening, microns* between warp wires	between short wires
		Original Sieve Set I	
80	8805	186	174
100	8806	148	148
140	8807	107	102
200	8808	78	75
325	8809	46	46
		Original Sieve Set II	
80	8889	185	174
100	8890	144	140
140	8891	104	107
200	8892	77	73
325	8893	43	45
		New No. 325 Sieves	
325	8887	41	43
325	8888	41	42

* Measurements were made by the National Bureau of Standards' Metrology Division with an accuracy sufficient to determine whether the openings were within the limits permitted by specification. The errors, according to the Bureau, are probably not in excess of about 1 micron.

£100 Metallurgy Awards

Bristol Firm to Provide Prize Funds

THE directors of Capper, Pass & Son, Ltd., Bristol, concerned at the dearth of published papers on processes and plant used in extraction metallurgy and in the fabrication of non-ferrous metals, have made available £200 per annum for a period of seven years to be applied as follows:—

(*a*) £100 per annum to be available for one or more awards to the authors of papers on some aspect of non-ferrous extraction metallurgy;

(*b*) £100 per annum to be available for one or more awards to the authors of papers relating to some process or plant used in the extraction or fabrication of non-ferrous metals.

Eligibility

Both papers must be contributed by persons engaged full time in industry or practice and the fund will be administered by the Councils of the Institution of Mining and Metallurgy and of the Institute of Metals, which have appointed a joint adjudicating committee.

The Institution and the Institute hope that the offer will stimulate the writing of many papers. Papers on extraction metallurgy should preferably be submitted to the Institution of Mining and Metallurgy, while those on processes and plant used in the fabrication of non-ferrous metals should preferably be offered to the Institute of metals. Both societies are prepared to accept papers of suitable quality from non-members.

South African Steel Plan

Steel output in South Africa is at present estimated at 500,000 tons per annum, the main producer being ISCOR (South African Iron and Steel Industrial Corporation). The corporation's chairman, Dr. H. J. Van der Bijl, has stated, however, that extensive developments are now to be made on the Rand. One project, the Vanderbijl Park steel plant, is already in operation. It aims at a production rate of 300,000 tons per year—to be achieved within the next 18 months—thereafter rising, it is hoped, to 1 million tons in five years and 2 million tons in ten years.

Poster Advertising Complaint.—Consideration by the Statutory Committee of the Pharmaceutical Society of a complaint that poster advertising of dispensing services by five subsidiaries of the Boots Pure Drug Co. was contrary to the society's code of professional conduct, has been adjourned for a year.

Developing U.S. Furnace Technique

More Cheap Oxygen and Better Heat Utilisation

U.S. steel production can be speeded up by the application of techniques developed in pre-war Germany for the large scale manufacture of oxygen, Barnett F. Dodge and G. Lund, of Yale University, reported to the 14th annual chemical engineering symposium of the American Chemical Society. Construction of oxygen processing plants on a scale "only dreamed of before" would enable the U.S.A. to increase its steel output and at the same time achieve economies through cheaper combustion techniques.

Oxygen on a "mammoth tonnage basis" nears reality in the U.S.A. to-day, the report asserted, with two large plants now under construction, capable of producing 1600 tons of oxygen per day, and many more such plants in the planning stage. The equipment necessary to accomplish this increased oxygen manufacture is a regenerator, a heat exchanger consisting of a shell or vessel filled with packing material. When the regenerator is in operation, the fluid which is to yield heat first passes through the bed of packing, storing up heat in the packing material. After a suitable interval, the flow is diverted to a similar vessel. The heat stored in the packing is then given to a fluid intended to receive heat. In this way heat is transferred indirectly from one fluid to another by an intermittent process instead of the direct transfer that occurs continuously in the recuperative type of exchanger. By having two regenerators, one storing heat and the other giving it up at the same time, the heat exchange becomes a continuous process.

Dual Function

Another advantage of the regnerators in a low temperature process is that they serve as air purifiers while performing their heat-exchange functions, thus eliminating expensive chemical processes to treat the air for purification purposes. Instead of 20 tons per day from a single plant, between 1000 and 2000 tons are needed, it was said Instead of costing $1 or more per 1000 cu. ft., the oxygen should not cost more than about 12 cents.

"Progress towards this goal has been slow," Prof. Dodge said. "All the principles for cheap oxygen production on a tonnage scale have been known for at least 25 years but the incentive was never strong enough to develop the large items of equipment necessary—the high speed centrifugal compressors, the turbine expanders, the rectifying columns and heat exchangers."

High temperature furnaces for processing and hardening metals can be made hotter and more efficient by modifying their design to make possible maximum utilisation of heat from exhaust gases, Jack Ruebler, of the Surface Combustion Corporation, Toledo, Ohio, declared in another report presented to the meeting. Explaining that most furnaces depend chiefly upon radiation, heat emanating from glowing gases or walls, he said that design engineers should put more stress on convection.

Importance of Convection

Present calculations demonstrate that under ideal conditions, approximately 20 per cent of the total heat input can be accomplished by convection when rapid heating with high-temperature furnaces is practised. The importance of convection becomes more pronounced as the temperature is reduced, becoming equal to radiation at about 1350°F. Even at very high temperatures the convection effect is too important to be neglected for practical considerations. Results reveal that either more rapid heating at a definite furnace temperature or equally rapid heating at a temperature roughly 100° lower may be accomplished by designing high convection into a furnace for that specific purpose.

Six M. Tons of German Steel

German steel producers in the Anglo-American bi-zone have been ordered to produce 6 million tons of steel during the economic year commencing April 1. To this end, Anglo-American authorities have agreed to release sufficient currency to import 4 million tons of iron ore. There is some doubt, however, whether this quantity will be available from ore-producing countries.

Official Notices

Lithopone Price Raised.—Following investigation by the Board of Trade's Advisory Accountants on lithopone prices, the Board has agreed that the price charged for lithopone as from March 1, 1948, should be £33 12s. 6d. per ton. The rise in price has been necessitated in part by the increased cost of imported materials.

Larger Olive Oil Imports.—The Ministry of Food is now prepared to recommend the issue of import licences for additional quantities of edible olive oil from sources and at prices to be approved by the Ministry. Distribution will continue through the Olive Oil Importers' Association, 11 Ironmonger Lane, London, E.C.2, which by arrangement with the Ministry, is the sole buyer of imported oil and to which importers should make their offers direct.

Prices of Oils and Fats.—The Ministry of Food announces that no changes will be made in the published prices of (a) unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four-week period ending March 27, and (b) refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight weeks period ending April 24.

Freer Supplies of Castings.—The Iron and Steel Board and the Ministry of Works have decided that, commencing Period II, 1948, the issue of form M authorisations to consumers' or merchants' stockholding licences to acquire (a) Cast-iron rainwater and soil goods including smoke pipes; (b) Cast-iron hot water pipes and fittings; (c) Manhole covers and frames and sundry builders' unfitted castings; and (d) Furnace pans, will be discontinued and that the manufacturers will receive bulk allocations to cover supplies of these items.

Private Imports of Derris.—The Board of Trade announces that no further purchases of derris or other rotenone-containing materials will be made on Government account. In future, all imports of these materials will be on private account but, for the time being, importers will be required to purchase from Government stocks one ton for each ton imported. Applications for import licences should be addressed to Board of Trade, Import Licensing Department, 189 Regent Street, London, W.1. The acquisition and disposal of derris and other rotenone-containing materials continues to be controlled by licence under the Control of Derris (No. 1) and (No. 2) Orders.

Parliamentary Topics

Publication of Industrial Profits.—Arrangements have been made for the collection and publication of profit statistics for the main industrial groups, commencing with those for 1947.—Sir Stafford Cripps.

Potash Supplies.—Potash supplies have been arriving at a record rate, and further considerable quantities are expected. By the end of March, sufficient supplies should have arrived to permit reasonable dressings for all spring crops.—Mr. T. Williams.

U.S. Coal.—Imports of U.S. coal have totalled 606,000 tons, and have cost about £3 million c.i.f. It was sold by the National Coal Board at prices ruling for comparable grades of British coal. It is not the Government's intention to purchase further supplies from the U.S.A.—Mr. H. T. Gaitskell

Fish Albumen Experiments.—Government scientists are studying the uses of albumen derived from a number of sources (including fish) with a view to its possible use in pharmaceutical products, the leather industry, synthetic resins, lacquers, foam extinguishers, food products, etc.—Dr. E. Summerskill.

Atomic Energy Precautions (Harwell).—In reply to a question by Major Beamish, Mr. G. R. Strauss, Minister of Supply, said that water taken from the Thames for use at the Atomic Energy Research Establishment, Harwell, would be returned to the river free from risk of harmful radioactivity. (All the points dealt with in the reply were published in THE CHEMICAL AGE, January 31).

Scientific Management

By the application of principles of scientific management on a wider scale better supplies of all basic commodities could be procured, said Mr. J. A. R. Stedeford, chairman and managing director of Tube Investments, Ltd., at a Press conference in London last week. Resulting from the introduction of methods of scientific management to some of his own firm's subsidiary companies, there had been overall increases in productivity. At one factory output had gone up by 64 per cent., with an increase in the total volume of output of 31 per cent.

Borax U.S. Subsidiary

In the chairman's statement accompanying the directors' report and statement of accounts of Borax Consolidated, Ltd., reference is made to the satisfactory results of the United States Potash Co., attributed to efficient management and installation improvements. Further capital expenditure is being undertaken.

Home News Items

Whale Oil For Britain.—Carrying enough whale oil to make nearly 15,000 tons of margarine and cooking fat, the Norwegian ship *Norvinn* recently docked at Salford after a two months' Antarctic voyage.

Impervious Butyl.—Large-scale tests of inner tubes made from butyl which have been carried out at Fort Dunlop are reported to have shown 10 times better results than natural rubber in resisting the passage of air through the walls of a pneumatic tube.

Record Penicillin Production.—January was a record month for the Glaxo Laboratories' penicillin production plant at Barnard Castle, Co. Durham. Good work by the primary and secondary production teams resulted in a packed output 70 per cent greater than in any previous month. Assistance in packing came from teams at the company's Greenford and Stratford plants.

Diamond Jubilee Service.—A service was held on February 29 at Christ Church, Port Sunlight, to commemorate the diamond jubilee of Port Sunlight. The service was attended by the Mayor and Mayoress of Bebington (Ald. and Mrs. Henry Smith) and the lessons were read by Viscount Leverhulme, governor, and Mr. G. A. S. Nairn, chairman of Lever Bros. (Port Sunlight), Ltd.

New Oil for Spinning Industry.—A new spindle lubricant—technical white oil, will shortly be introduced to the mills, in the hope that it will greatly reduce the incidence of "spinner's cancer." The oil has proved to be free from the irritant agent, and for lubricating is regarded as superior to the normal mineral oil. Dr. C. C. Twort and Dr. J. M. Twort carried out the original research work for the Manchester Committee on Cancer.

Strike Withholds Gas Supplies.—A notice suspending gas supplies to industrial consumers has been issued by Sheffield Gas Company. This is the result of the strike of 1500 workers at eleven coke oven plants in South Yorkshire. Mr. Ralph Halkett, general manager and engineer of the gas company, stated on February 29 that the company had lost 50 per cent of its gas from the coke ovens, and the position was not yet stable. It had been decided to allow 10 of the largest steel firms in the city to use 50 per cent of normal requirements on condition that they immediately cease operating on receiving notice to do so from the company. More than 1000 important firms in the steel, silver and cutlery industries would be affected by the curtailment of supplies.

Science and Public Services.—Sir John Anderson, Messel Medallist of the Society of Chemical Industry, is to lecture to the Edinburgh section of the Society on July 14, on "Science in Relation to Public Services."

Consett Coking Plant.—Part of a £3 million development plan by the Consett Iron Company, Durham, the third largest coking plant in the country, consisting of 54 coke ovens and by-product plants, was opened at Consett this week.

Missing the Coal Target.—Coal production in the north-west for the five-day week ending on February 27 was 293,013 tons, a drop of more than 3000 tons on the previous week and 18,000 tons below the target figure of 312,000.

Prospective Use For Resins.—When Prof. J. B. Speakman, of Leeds University, visited South Africa recently, he suggested that the current shortage of jute woolpacks might be overcome by manufacturing them from specially toughened paper impregnated with resin.

Less Coal Output.—Coal output in the U.K. last week was again less than the previous two weeks and tonnage lost showed a sharp rise. On the other hand, opencast production figures attained the highest level for some weeks. This improvement, however, fails to offset the falling figures for deep-mined coal. Provisional figures of last week's output are 3,878,100 tons deep-mined and 204,100 tons opencast. Overall loss on the previous week was 40,800 tons.

Tyre Diamond Jubilee.—Dunlop celebrations of the diamond jubilee of the pneumatic tyre were held last Saturday at the May Street premises in Belfast, where the tyres were invented, and also at Fort Dunlop. Alderman W. F. Neill, M.P., the Lord Mayor of Belfast, laid a wreath on the May Street memorial to John Boyd Dunlop and 84-year-old Robert Carlisle, who assisted in the making of the first pneumatic tyre, placed a wreath on the Fort Dunlop memorial.

Methanol for Motor-cycles.—Scottish motor cyclists are displaying interest in the adoption by English clubs of methanol as fuel. Members of two Scottish clubs are understood to be combining to buy a bulk supply, and believe that by doing so they may bring down the present price of 8s. 6d. per gallon to about 4s. Although the use of such blends is legal at the moment, fears have been expressed that a large-scale adoption of this type of spirit might encourage the authorities to ban its use.

Next Week's Events

MONDAY, MARCH 8

Royal Institute of Chemistry (London and S.E. Counties Section). Woolwich Polytechnic, S.E.18, 6.45 p.m. H. Baines: "Colour Photography." (Sheffield, S. Yorks and N. Midlands Sections): Royal Victoria Hotel, Sheffield, 7 p.m. Short papers by members.

Textile Institute (Lancashire Section). Manchester, 7.0 p.m. Dr. B. P. Ridge: "Some Aspects of Synthetic Fibres."

Institution of the Rubber Industry (Midland Section). Burton-on-Trent, 7.15 p.m. L. E. Puddefoot: "Rubber Adhesives."

Institute of Petroleum. Engineers' Club, Manchester, 6 p.m. E. Thornton: "The Fighting of Oil Fires."

Royal Society of Arts. John Adam Street, Adelphi, W.C.2, 4.30 p.m. Prof. E. K. Rideal: "Colloids" (Cantor Lecture).

TUESDAY, MARCH 9

Institution of Chemical Engineers. Geological Society's Apartments, Burlington House, Piccadilly, W.1, 5.30 p.m. Dr W. H. Wheeler: "Rocket Propulsion: A Restricted Survey". J. E. C. Topps: "Thermodynamics of the Combustion Process in Gas Turbines."

Royal Institute of Chemistry (Liverpool and N.W. Section). Wigan, 7 p.m. G. F. Reynolds: "Technical Uses of Soap in Industry."

Hull Chemical & Engineering Society. Church Institute, Albion Street, Hull, 7.30 p.m. G. Colman Green: "The Story of Morphia."

WEDNESDAY, MARCH 10

Institute of Welding. (North London Branch). Technical College, Acton, W.3, 7.30 p.m. E. Ryalls: "The Bronze Welding of Cast Iron."

Royal Society of Arts. John Adam Street, Adelphi, W.C.2, 2.30 p.m. Roland E. Dangerfield: "The Trade and Technical Press."

Northampton Polytechnic. St. John Street, E.C.1, 7.0 p.m. G. Kinner: "Developments in Lubricants."

Society of Chemical Industry (Plastics Group and Northern Ireland Section). Central Hall, Municipal College of Technology, Belfast, 6.30 p.m. H. V. Potter: "Industrial Applications of Plastics." (Food Group). Rooms of The Chemical Society, Burlington House, Piccadilly, W.1, 6.15 p.m. Annual General Meeting. "The Microbiological Control of Therapeutic Products."

THURSDAY, MARCH 11

Society of Chemical Industry (Food Group and Nottingham Section). Welbeck Hotel, Nottingham, 7.15 p.m. W. Cunliffe: "Physical Chemistry of Food with Particular Reference to Bakery Products."

Chemical Society (Manchester Section). Chemistry Department, Manchester University, 6.30 p.m. Prof. H. L. Riley: "Amorphous Carbon."

Oil & Colour Chemists' Association (Scottish Section). St. Enoch Hotel, Glasgow, 7.0 p.m. J. T. Richmond: "Titanium Pigments."

Royal Institution of Great Britain. 21 Albemarle Street, W.1, 5.15 p.m. Sir Lawrence Bragg: "Current Research Work in the Cavendish Laboratory."

FRIDAY, MARCH 12

Oil & Colour Chemists' Association (Bristol Section). Grand Hotel, Bristol. 7.30 p.m. Seventh Ordinary Meeting.

Chemical Society (Glasgow Section). Chemistry Lecture Theatre, Glasgow University, 7.15 p.m. Prof. E. L. Hirst: "Some Problems in the Chemistry of Starch and Glycogen."

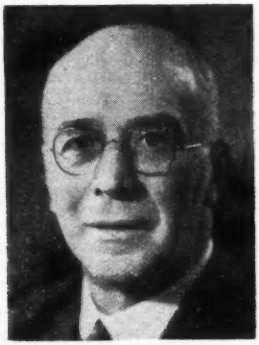
Midland Chemists' Committee. The University, Edmund Street, Birmingham, 6.30 p.m. Prof. W. Wardlaw: "Valency."

Science Teachers' Conference

A three-day conference of science teachers from Scottish schools is to be held at Glasgow University during April 1-3. It has been organised by the Scottish branch of the Science Masters' Association and several of the university departments will collaborate. Sir Hector Hetherington, Principal of Glasgow University, will preside. There will be also an exhibition which will include apparatus used in the release of atomic energy, samples of surplus equipment lent by the Ministry of Supply, and novel implements serving as aids in teaching furnished by members of the association and by scientific instrument makers. Films and demonstrations illustrating research and other laboratory work will be shown, with the Glasgow University departments of chemistry, natural philosophy, and zoology taking part. The lecturers opening the discussions will include Profs. Cook, Dee, Smart, Walton and Yonge, of Glasgow, and Dr. Meier, of London University.

PERSONAL

SIR ARTHUR JOHN GRIFFITHS SMOUT, who has been elected president of the Institute of Metals, joined the Elliott group of metal companies in 1905 as a student apprentice.



Sir Arthur Smout

From 1920-24 he was works manager of Elliott's Metal Company and from 1924-46 works manager to the Elliott group, which was merged into Imperial Chemical Industries, Ltd., on the latter's formation in 1926. He became managing director in 1934 and chairman from 1934-42 of what is now known as Imperial Chemical Industries, Ltd., Metals Division. He was appointed to the board of Imperial Chemical Industries, Ltd., in 1944, with responsibility for the company's metal and ammunition interests. Director-general of Ammunition Production at the Ministry of Supply from 1942-45, he was knighted in July, 1946.

The Institute of Metals (Platinum) Medal for 1948 has been awarded to MR. ROBERT CROOKS STANLEY, chairman and president of the International Nickel Company of Canada, Ltd., in recognition of his outstanding services to the non-ferrous metal industries. Better known among his many contributions to metallurgy was the introduction in 1905 of Monel metal.

MR. LAURENCE MERRIAM, 54 years-old managing director of B.X. Plastics, Ltd., and Plastics Controller from 1941-45, has been appointed by the Government as special examiner to review Board of Trade controls. Mr. Merriam is a member of the executive committee of the British Plastics Federation, the executive branch of the Association of Chemical and Allied Employers, and employers' representative on the Joint Industrial Council of the chemical industry.

VISCOUNT LEVERHULME last week read a paper on "The British Sense of Humour" to the Liverpool Literary and Philosophical Society.

MR. DEREK MATON, of Glaxo Laboratories, Ltd., recently left England for Rome by air to take up the post of production manager at the company's plant at Verona, Northern Italy.

To mark his 50 years' association with the rubber industry, MR. IVOR W. DAVIES, general sales manager of Dunlop's footwear division, was presented with a gold cigarette case at a complimentary dinner in the Adelphi Hotel, Liverpool.

MR. A. S. WARD has relinquished his position as managing director of Park Gate Iron and Steel Co., Ltd., while remaining its chairman. MR. T. W. EDWARDS and MR. C. H. T. WILLIAMS have been appointed joint managing directors. Other board changes are: MR. A. K. WILSON has resigned, and MR. F. WOODIFIELD has been appointed director-works manager.

MR. ROBERT W. LAMONT, managing director of Watson Laidlow & Co., Ltd., the Glasgow manufacturers of chemical and laundry machinery, started on a 40,000-mile round-the-world business trip from Prestwick last week, embracing Canada, U.S.A., Honolulu, Australia, India, Egypt, South Africa and Kenya. He said: "I am going to get orders for machinery exports and my strict schedule will leave no time for pleasure."

I.C.I. to Harwell

MR. A. S. WHITE has resigned his post as group leader of the Chemical Engineering Section of Imperial Chemical Industries (Dyestuffs Division) to take up the appointment of superintendent of the Chemical Engineering Division of the Atomic Energy Research Establishment at Harwell. Mr. White had been with I.C.I. for 14 years and worked in the research departments at both Blackley and Huddersfield.

Mond Nickel Fellowship Awards

MR. L. H. WALKER, Reynolds Tube Co., Ltd., and MR. D. R. G. DAVIES, Richard Thomas & Baldwins, Ltd., have been awarded 1947 fellowships by the Mond Nickel Fellowships Committee. Applications are now invited by the committee for five fellowships for 1948. These will be awarded to candidates of British nationality possessing degrees or equivalent qualifications entitling them to occupy senior positions in British metallurgical industries.

Overseas News Items

Rayon From Beech Pulp.—A new German process for making strong rayon from beechwood pulp was reported on February 27 by British and American officials, who predicted it will save German tyre manufacturers £375,000 annually in imports.

Lead-Zinc Ore in Nigeria.—According to Mr. Oscar Weiss, who has been surveying territory in Ogojar Province of Southern Nigeria, there are valuable lead-zinc deposits there. Relatively cheap river transport, and nearness to the U.K. warrant an extensive exploration programme.

Caustic Soda Imports—India.—Indian importers of caustic soda will be granted licences freely between now and June 30, provided it can be established that the importer can obtain the quantity applied for at a c.i.f. value not exceeding Rs. 56 per cwt. In some instances a maximum of Rs. 60 per cwt. may be allowed.

Quebracho Exports.—Total shipments of quebracho extract from Argentina and Paraguay last year totalled 263,079 tons, compared with about 290,000 tons in 1946. Of this figure, Argentina supplied 240,454 and 240,933 tons, respectively. The United States was the chief buyer with 131,830 tons, Britain took just over 24,000 tons and France over 16,100 tons.

U.S. Oil Exports Reduced.—Following consultation with the foreign governments concerned, the U.S. Department of Commerce has announced further reductions of 599,000 barrels, largely of petrol and fuel oil, in U.S. oil export allocations for the first quarter of 1948. The revised quotas bring total planned shipments of U.S. petroleum products for the first three months of this year to 9,031,000 barrels.

Power From Atomic Pile.—A practical application of some of the energy generated in the course of nuclear fission is expected to be made next year, according to reports from New York. Contracts are being negotiated for a steam plant to derive power from the atomic pile being built at Brookhaven, Long Island. Heat generated will be carried off by air, which will be used to make steam, which will generate electricity to be used for driving cooling fans and other apparatus.

Rumanian Oil Figures.—Rumania's oil output amounted to only 3.8 million tons last year, a marked decline from the 4.3 million tons reported for 1946. Last year's target figure was set at 3.9 million tons.

Palm Oil for Holland.—The Dutch Government has purchased 15,000 tons of palm oil (mainly from the Amsterdam Trading Co.) at Fls.1600 a ton. It is to be used for the manufacture of soap, some of which will be exported.

Uranium in China. — Occurrences of uranium have been discovered in Eastern Kwangsi and a further survey is to be carried out in order to ascertain the extent to which they can be exploited. Deposits of gold, manganese and asbestos are reported from North-western Hopei.

Lyons Fair—1948.—The Lyons Fair, 1948, to be held from April 3-12, will include sections devoted to pharmaceutical products, drugs, etc. (Group II, Petit Palais), and metallurgy, tools and machinery for all industries (Group 3, Hall de la Mecanique and stands flanking Main Avenue).

Norwegian Aluminium Production.—The new Ardal aluminium factory, the largest in Norway, has just started production. Eight furnaces are now working in one building and daily output is at present 16 tons. There is provision for 172 furnaces at the factory, and when they are all in operation, output will amount to about 33 tons a day (12,000 tons a year). Exports will start this year.

U.S. Aluminium Interests in Formosa.—Reynolds Metal Co. of America, is reported to have concluded an agreement with the Chinese Metal Resources Commission on the investment of $7 million in the Kaosiung aluminium plant on Formosa (Taiwan). The two companies will operate the plant jointly and part of the money will buy equipment to manufacture finished aluminium goods for the Chinese market.

Japanese Chemicals.—Report No. 25 issued by Gen. MacArthur's H.Q. on industrial production in Japan, gives the following figures for chemicals in September (August in parenthesis): Ammonium sulphate 55,594 metric tons (55,804); calcium cyanide 18,051 (21,724); caustic soda 4549 (4773). Production rises were registered only in sulphuric acid, and in domestic salt, the September figures being 137,340 tons and 18,932 tons respectively.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *— followed by the date of the Summary, but such total may have been reduced.)

MIRALITE, LTD., London, E.C., manufacturers of aluminium alloy. (M., 6/3/48.) February 3, £1500 debenture stock; general charge. *£1500 debentures. July 31, 1947.

BRITISH ALUMINIUM CO., LTD., London, E.C. (M., 6/3/48.) February 6, disposition by Fife County Council with consent, granted in implement of a Trust Deed dated July 30, 1947; charged on certain ground at Burntisland. *£3,135,559. April 11, 1947.

BRITISH COAL DISTILLATION, LTD., London, S.W. (M., 6/3/48.) December 10, £40,550 First Participating debenture stock with a premium of £10 per cent secured by a deed poll dated November 27, 1947; general charge (subject to, etc.). *£46,620. January 13, 1948.

LONDON OIL CORPORATION, LTD. (formerly LONDON OIL BUYERS CORPORATION, LTD). (M., 6/3/48.) February 2, debenture, to Barclays Bank Ltd., securing all monies due or to become due to the Bank; general charge. *Nil. December 31, 1946.

LANGKON NORTH BORNEO RUBBER LTD., London, E.C. (M., 6/3/48.) February 6, debenture to Martins Bank Ltd., securing all monies due or to become due to the Bank; charged on estate near Kudat, British North Borneo, and general charge. *Nil. December 2, 1917.

WALTON CHEMICAL CO., LTD., Liverpool. (M., 6/3/48.) February 2, mortgage, and charge, to Midland Bank Ltd., securing all moneys due or to become due to the Bank; charged on factory at Wilton Street, Liverpool, 3, together with machinery, fixtures, etc., also general charge. *£1338 (Bankers). May 27, 1947.

BAIRD & TATLOCK (LONDON), LTD., laboratory furnishers, etc. (M., 6/3/48.) February 6, mortgage and charge, to Midland Bank, Ltd., securing all monies due or to become due to the Bank; charged on 14 St. Cross Street, and 21 Hatton Yard, 15 St. Cross Street, 16 and 17 St. Cross Street (basements), land and buildings, at rear of 15 and 16 St. Cross Street, all E.C., Higham Lodge, Walthamstow, and Rokeby, Esher, and machinery, fixtures, etc., and general charge. *£6500. December 14, 1946.

Satisfactions

HILDEN LABORATORIES, LTD., London, E.C. (M.S., 6/3/48.) Satisfaction February 5, of charge registered August 7, 1945.

W. EDWARDS & CO. (LONDON), LTD., scientific apparatus dealers. (M.S., 6/3/48.) Satisfaction February 9, of mortgage registered November 12, 1941.

Company News

Murex, Ltd., has declared an interim dividend on ordinary shares of 1s. 3d. per £1 unit (7½ per cent per annum) for 1947-48 on account of the ten months ended April 30.

New Companies Registered

Styrene Co-Polymers, Ltd. (449,544).—Private company. Capital £100. Manufacturers, producers, refiners and distillers, of styrene and styrene derivatives, mineral and vegetable oils, petroleum products and chemicals, etc. Reg. office: River Plate House, 12-13 South Place, E.C.2.

R. V. Copeland, Ltd. (449,534).—Private company. Capital £5000. Chemists, druggists, chemical engineers, sterilisers, manufacturers of chemical gases, drugs, medicines, etc. Directors: R. V. Copeland and Mrs. Ivy F. Copeland. Reg. office: Station Square, Petts Wood, Kent.

Sedgley Agencies, Ltd. (450,012).—Private company. Capital £1000. Manufacturing chemists, metal workers and metallurgists, manufacturers of plastics and plastic materials, etc. Directors: H. Collins and H. A. Bastick. Solicitors: Gouldens, 16 Byward Street, E.C.3.

Anglo-French Plastic Products, Ltd. (449,228).—Private company. Capital £100. Manufacturers, merchants, importers and exporters of and agents for natural and synthetic plastic substances, acetate, cellulose, chemicals, etc. Director: Mrs. Stella Smolen. Reg. office: Coventry House, 3 South Place, E.C.2.

Joseph Bancroft & Son Co. (England), Ltd. (449,075).—Private company. Capital £100. To acquire patents, concessions, etc., as manufacturers of chemicals, fine chemicals and chemical products, etc. Directors: B. Clark, and S. Clark. Secretary: D. J. Ironside. Reg. office: 19 Whiteladies Road, Bristol, 8

Cranfield Industries, Ltd. (449,872).—Private company. Capital £100. Manufacturers of chemicals, gases, drugs and medicines, etc. Directors: J. G. Gommes and Simone Gommes. Reg. office: 159 Finchley Road, N.W.3.

George W. Law & Co., Ltd. (449,825).—Private company. Capital £1500. Manufacturers of chemical gases, drugs, medicines, etc. Directors: Mrs. Martha H. Law, and Mrs. Kathleen M. Clarke, both of 26 Stamford Grove, Stalybridge.

Hankinsons (Ilford), Ltd. (449,987).—Private company. Capital £200. Manufacturing, research, dispensing and analytical chemists and druggists, etc. Directors: Mrs. Mary A. Prangnell, and J. R. Prangnell. Reg. office: 223 Ilford Lane, Ilford.

William Edge & Sons (Ireland), Ltd. (12,278).—Private company. Capital £2000. Manufacturers of disinfectants and antiseptics, dyes, and other chemicals, etc. Directors: A. M. Johnson, Ridge House, Ballybrack, Co. Dublin; H. C. Johnson and K. Edge.

Chemical and Allied Stocks and Shares

THE European news overshadowed stock markets, although Sir Stafford Cripps' latest reference to company taxation aroused hopes that the Profits Tax may not be further increased, and, as a result, there was a moderate rally in industrial shares. Apart from Transport stock, British Funds strengthened in anticipation of reinvestment arising from repayment of the £300,000,000 of 3 per cent Conversion Loan.

Reflecting the general trend, chemical and kindred shares rallied after earlier declines. Imperial Chemical were 45s. 9d., and Monsanto 5s. ordinary changed hands around 58s. 9d., while Turner & Newall firmed up to 76s. 3d., and United Molasses to 46s. 6d. Dunlop Rubber at 69s. were also better, but, in other directions, British Glues & Chemicals 4s. ordinary eased to 19s. 6d. A forthcoming public share offer is believed to be in respect of 800,000 5s. ordinary shares of Albright & Wilson, the well-known £1,500,000 chemical company.

W. J. Bush were 85s., and B Laporte 5s. shares again 21s. 10½d., but there was a further decline to £18½ in Glaxo Laboratories. British Drug Houses 5s. ordinary changed hands around 10s. Following declaration of the unchanged 20 per cent dividend, British Xylonite shares were slightly lower at £6 at which they yield 3¼ per cent. British Industrial Plastics 2s. ordinary units were 6s. 10½d. and yielded slightly under 6 per cent on the basis of the increased dividend of 20 per cent (against 12 per cent) for the past year.

The 5s. units of the Distillers Co. firmed up to 26s. 9d., British Plaster Board were 22s. 7½d., British Oxygen 90s. 7½d., while at 55s. Borax Consolidated deferred remained under the influence of the past year's results. British Aluminium were firm at 46s. 3d., with Imperial Smelting Steadier at 21s., and Amalgamated Metal 18s. 3d.

There was a rally in iron and steels, the good yields attracting buyers. United Steel were 27s. 9d., Stewarts & Lloyds deferred 51s., Guest Keen 45s., Dorman Long 29s. 4½d., and Babcock & Wilcox 65s. 6d. Textiles were also better with Courtaulds 41s. 6d. Lever & Unilever changed hands around 49s. 7½d. The market is pointing out that iron, steel and textile shares offer reasonable prospects of maintaining dividends and that in most cases yields are attractive. There is, of course, the possibility of nationalisation of iron and steel but the City view is that current market prices are below any fair basis of compensation.

Boots Drug improved moderately to 51s. 3d., Sangers were easier at 31s. 6d., and Timothy Whites 37s. 6d., Beechams deferred changed hands around 18s. 9d. Ilford 5s. ordinary at 24s. 3d. have been steady, and in other directions, General Refractories 10s. shares were 21s.

Oils lost ground with Anglo-Iranian down to £8 and Shell 76s. 3d. prices moving with the trend of markets, although it is realised that profits of the leading companies are probably on the up grade and indications are that world demand for oil will continue to expand for a long time to come. Trinidad Leaseholds 5s. units strengthened to 30s. 9d., and London & Thames Haven Oil were good at 16s. 9d. partly on talk of a possible deal in connection with the company's French intrests. There has been a good deal of activity in Kern Oil 3s. 4d. shares which have changed hands around 12s. 3d. accompanied by talk of a possible deal with the Standard Oil Co., but this lacks confirmation.

Celanese Rumour Denied.—It has been officially denied that there was any truth in the rumour that the closure of the British Celanese factory at Wrexham Trading Estate was imminent. An official said: "More than 800 people are now employed and expansion so far as circumstances permit will continue." At present warp knitted fabric and plastic powder are the principal products.

Prices of British Chemical Products

A CONTINUATION of firm price conditions has been reported from most sections of the market and the movement, as represented by contract deliveries, has been on a fairly substantial scale. A steady flow of new business for the general run of industrial chemicals has been in evidence and export inquiry is also maintained at a high level. The demand for the potash and soda compounds is persistent with an active interest displayed in chlorate of soda, yellow prussiate of soda, the dibasic and tribasic phosphates of soda and soda ash. There has been a brisk inquiry for white lead and red lead and an increasing interest in the copper compounds. Adverse conditions, with the demand continuing in excess of available supplies, summed up the position in the coal-tar products market.

MANCHESTER.—Market conditions remain very firm in all sections of the Manchester market for light and heavy chemicals and a generally strong tendency is reported, though there has not been much in the way of actual change since last report. Leading industrial consumers are specifying steadily for deliveries under contracts and a fair amount of replacement buying has again been reported over a wide range of products. On the export side actual shipments are well maintained and fresh inquiry has been circulating. Fertiliser materials are meeting with a steady demand and good deliveries are going forward, though certain of the compounds are in restricted supply. There is a brisk call for pretty well the whole range of light and heavy tar products.

GLASGOW.—In the Scottish chemical market business has continued to be quiet during the past week. There have been indications of a likely heavier demand for coal-tar products. In the export market, a number of orders have again been booked and more inquiries than of late have been received. In general, the position is fairly satisfactory with a steady volume of business in all classes of chemicals being transacted.

Price Changes

Rises: Hydrogen peroxide, oxalic acid, sodium phosphate, pitch and pyridine, sulphuric acid, sodium metaphosphate (calgon).

Reduction: Sodium phosphate (tri-sodium).

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £56 10s.; 80% pure, 1 ton, £58 10s.; commercial glacial 1 ton £70; delivered buyers' premises in returnable barrels: £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 1/5 tons, £86 10s.; single drums, £87 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton. f.o.r. MANCHESTER: £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate. — MANCHESTER: £41 per ton d/d.

Ammonium Carbonate.—£42 per ton d/d in 5-cwt. casks. MANCHESTER: Powder, £43 d/d.

Ammonium Chloride. — Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Antimony Oxide.—£162 10s. per ton.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—98/100% prime white crystals, 5-ton lots, £26 per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£23 per ton, d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 5¾d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Carbonate.—MANCHESTER: 1s. 8d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Sulphate.—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., from 201s. to 205s. per cwt. lots, d/d.

Formaldehyde.—£28 to £29 per ton in casks, according to quantity, d/d. MANCHESTER: £30 10s.

Formic Acid.—85%, £55 per ton for ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £70 per ton; dark tech., £60 per ton ex works; barrels returnable.

Lead Acetate.—White, 110s. to 115s. per cwt., according to quantity.

Lead Nitrate.—About £115 per ton d/d in casks. MANCHESTER: £115.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £106; orange lead, £118. Ground in oil: Red, £132; orange, £144. Ready-mixed lead paint: Red, £140; orange, £152 (subject to increase of £1 10s. per ton).

Lead, White.—Dry English, in 8-cwt. casks, £119 per ton. Ground in oil, English, in 5-cwt. casks, £143 per ton.

Litharge.—£103 10s. to £106 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 5s.

Magnesium Chloride.—Solid (ex wharf), £27 10s. per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt. lots, 7s. 6d.; smaller quantities dearer.

Mercurous Chloride.—8s. 10d. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 4s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£110 to £121 per ton packed in free 5-cwt. casks. MANCHESTER: £6 per cwt.

Paraffin Wax.—Nominal.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 9¾d. per lb.; ground, 10¾d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 10d. to 3s. 1d. per lb. d/d.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£42 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£45 to £47 per ton.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £17 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., for not less than 28 lb., 10s. 2d. per lb.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrite.—£22 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 11s. 9d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 per ton d/d for ton lots. Tri-sodium, £32 per ton d/d for ton lots (crystalline).

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 10s. 2d. to £7 10s. 2d. per ton; 140° Tw., arsenic-free, £5 2s. 6d. per ton: 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt., for 10 cwt. or more, £15 8s.; 5 to 10 cwt., £15 9s. 6d.; 2 to 5 cwt., £15 11s.; 1 to 2 cwt., £15 13s. Less than 1 cwt., 3s. 1d. to 3s. 3d. per lb. d/d, according to quantity.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £75 10s.; green seal, £74 10s.; red seal, £73.

Zinc Sulphate.—No quotation.

Rubber Chemicals

Antimony Sulphide.—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£50 10s. to £53 10s. per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £32 17s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 5s., rising by 1s. 6d. per ton per month to March, 1948.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers. — Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid. — Crystals, 11½d. per lb. Crude, 60's, 3s. 6d. to 4s. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6½d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Napthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 100s. per ton f.or. suppliers' works; export trade, £7 10s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 16s. to 20s. per gal.

Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2¼d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

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